

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Gregory B. Jaczko, Chairman
Kristine L. Svinicki
George Apostolakis
William D. Magwood, IV
William C. Ostendorff

In the Matter of)
)
)
FIRSTENERGY NUCLEAR OPERATING COMPANY) Docket No. 50-346-LR
)
(Davis-Besse Nuclear Power Station, Unit 1))
)

CLI-12-08

MEMORANDUM AND ORDER

This proceeding stems from the application of FirstEnergy Nuclear Operating Company (FirstEnergy) to renew its operating license for the Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse) for an additional twenty years.¹ Beyond Nuclear, Citizens Environment Alliance of Southwestern Ontario, Don't Waste Michigan, and the Green Party of Ohio (collectively, Petitioners) filed a joint intervention petition in opposition to FirstEnergy's application.² In

¹ See *generally* Letter from B.S. Allen, FirstEnergy, to NRC Document Control Desk, "License Renewal Application and Ohio Coastal Zone Management Program Consistency Certification" (ADAMS accession number ML102450572 (package)).

² See *Beyond Nuclear, Citizens Environment Alliance of Southwestern Ontario, Don't Waste Michigan, and the Green Party of Ohio Request for Public Hearing and Petition for Leave to Intervene* (Dec. 27, 2010) (Petition) (Errata filed Jan. 5, 2011). Petitioners also submitted an accompanying expert Declaration and curriculum vitae of Dr. Alvin Compaan. *Declaration and Curriculum Vitae of Alvin Compaan, Intervenors' Expert Witness on Contention #2* (dated Dec. 27, 2010, filed Dec. 28, 2010) (Compaan Declaration). The Petition also attached or referenced supporting information. Some, but not all, of these references were identified by Petitioners and the Board as numbered exhibits. Where applicable, we use the same designations.

LBP-11-13, the Board granted a hearing, admitting two contentions and finding that all four Petitioners had demonstrated standing.³ FirstEnergy has now appealed LBP-11-13.⁴ As discussed below, we affirm in part, and reverse in part, the Board's decision.

I. PROCEDURAL BACKGROUND

Petitioners submitted four environmental contentions. The first three concern the adequacy of FirstEnergy's analysis of alternatives to license renewal—specifically wind energy, photovoltaic solar energy, and the combination of compressed air energy storage with wind and/or solar energy. The fourth contention challenges FirstEnergy's analysis of severe accident mitigation alternatives (SAMAs) at Davis-Besse. Both FirstEnergy and the NRC Staff submitted Answers in which they argued that all four contentions were inadmissible.⁵ Petitioners replied to those answers.⁶ In early March, the Board held a prehearing conference on the intervention petition.⁷

The Board subsequently issued LBP-11-13, finding that all four Petitioners had demonstrated standing, admitting all three "alternative energy" contentions (as reformulated and combined into one contention by the Board), and also admitting the SAMA contention (as limited

³ LBP-11-13, 73 NRC __ (Apr. 26, 2011) (slip op.).

⁴ See *FirstEnergy's Notice of Appeal of LBP-11-13* (May 6, 2011); *FirstEnergy's Brief in Support of the Appeal of LBP-11-13* (May 6, 2011), at 3 (Appeal). FirstEnergy does not challenge the Board's rulings on standing.

⁵ See *FirstEnergy's Answer Opposing Request for Public Hearing and Petition for Leave to Intervene* (Jan. 21, 2011) (FirstEnergy Answer); *NRC Staff's Answer to Joint Petitioners' Request for a Hearing and Petition for Leave to Intervene* (Jan. 21, 2011) (Staff Answer).

⁶ See *Joint Intervenors' Combined Reply in Support of Petition for Leave to Intervene* (Jan. 28, 2011). Petitioners filed Errata to this pleading on February 9, a "Corrected Version" on February 23, and a "2nd, Final Corrected Version" on February 24, 2011. We reference here the February 24 filing. See *Joint Intervenors' Combined Reply in Support of Petition for Leave to Intervene (2nd, Final Corrected Version)* (Feb. 24, 2011) (Reply).

⁷ See Transcript of Hearing for Oral Argument (Mar. 1, 2011) (Tr.)

by the Board). FirstEnergy now appeals LBP-11-13 under 10 C.F.R. § 2.311(d)(1).⁸ Petitioners oppose FirstEnergy's appeal.⁹

II. DISCUSSION

A. Applicable Procedural Standards

A request for hearing and petition for leave to intervene must set forth with particularity the contentions sought to be raised. For each contention, the request and petition must satisfy all six of the following requirements:

- (i) Provide a specific statement of the issue of law or fact to be raised or controverted . . . ;
- (ii) Provide a brief explanation of the basis for the contention;
- (iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding;
- (iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding;
- (v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue . . . together with references to the specific sources and documents on which the requestor/petitioner intends to rely . . . ; [and]
- (vi) [P]rovide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.¹⁰

As we have outlined in earlier decisions and most recently in the *Seabrook* decision,¹¹ the NRC in 1989 revised its rules to prevent the admission of "poorly defined or supported

⁸ Appeal at 3.

⁹ See *Joint Intervenors' Brief in Opposition to FENOC's Notice of Appeal and Brief* (May 16, 2011) (Petitioners' Opposition). Subsequent to the appeal, FirstEnergy filed a motion asking the Board to dismiss the consolidated Contention 1 on grounds of mootness. *FirstEnergy Nuclear Operating Company's Motion to Dismiss Contention 1* (Dec. 19, 2011). The Board denied FirstEnergy's motion. Memorandum and Order (Denying Motion to Dismiss Contention 1) (Jan. 10, 2012) (unpublished), *reconsideration denied*, Order (Denying Motion for Leave to File a Motion for Reconsideration) (Jan. 30, 2012) (unpublished).

¹⁰ 10 C.F.R. § 2.309(f)(1).

contentions,”¹² or those “based on little more than speculation.”¹³ The agency deliberately raised the contention-admissibility standards to relieve the hearing delays that such contentions had caused in the past.¹⁴ Prior to our 1989 rule revision, intervenors were able to trigger hearings after merely “copying contentions from another proceeding involving another reactor,” even though many of these intervenors often had “negligible knowledge” of the issues “and, in fact, no direct case to present.”¹⁵ Although under our current rules, intervenors of course may use the discovery process to develop a case once contentions are admitted, “contentions shall not be admitted if at the outset they are not described with reasonable specificity or are not supported by some alleged fact or facts demonstrating a genuine material dispute” with the applicant.¹⁶ We properly “reserve our hearing process for genuine, material controversies between knowledgeable litigants.”¹⁷

Our rules of practice provide for an automatic right to appeal a licensing board decision deciding standing and contention admissibility, on the question whether a petition to intervene and request for hearing should have been granted, or denied in its entirety.¹⁸ Here, FirstEnergy argues that the Board should have denied Petitioners’ hearing request because Petitioners

¹¹ *NextEra Energy Seabrook, LLC* (Seabrook Station, Unit 1), CLI-12-5, 75 NRC __ (Mar. 8, 2012) (slip op. at 7).

¹² *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 334 (1999).

¹³ *Id.* See also *Florida Power & Light Co.* (Turkey Point Generating Plant, Units 3 and 4), CLI-01-17, 54 NRC 3, 14 (2001).

¹⁴ *Oconee*, CLI-99-11, 49 NRC at 334.

¹⁵ *Id.* See also *Turkey Point*, CLI-01-17, 54 NRC at 19.

¹⁶ *Oconee*, CLI-99-11, 49 NRC at 335 (citation omitted).

¹⁷ *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 219 (2003).

¹⁸ 10 C.F.R. § 2.311(c), (d)(1). See, e.g., *Detroit Edison Co.* (Fermi Nuclear Power Plant, Unit 3), CLI-09-22, 70 NRC 932, 933 (2009).

submitted no admissible contentions. In examining contention admissibility, we generally defer to the Board unless we find either an error of law or abuse of discretion.¹⁹ With these standards in mind, we turn to FirstEnergy's appeal.

B. Analysis of the Board's Rulings on Contention Admissibility

1. Alternative Energy Sources

a. Background

Our regulations implementing Section 102 of the National Environmental Policy Act (NEPA)²⁰ require the Environmental Reports submitted by license renewal applicants to address the environmental impacts of the proposed action and also to compare them to impacts of alternative actions.²¹ NEPA requires the consideration of "reasonable" alternatives.²² We discussed the scope of the energy-alternatives analysis in our recent *Seabrook* decision, and do not repeat that discussion here.²³

To challenge such an analysis, a petitioner ordinarily must provide "alleged facts or expert opinion" sufficient to raise a genuine dispute as to whether the best information available today suggests that a commercially viable alternate technology (or combination of technologies) is available now, or will become so in the near future, to supply baseload power.²⁴ As we noted in *Seabrook*, we necessarily consider energy alternatives in a pragmatic fashion, based on the

¹⁹ See, e.g., *South Carolina Electric and Gas Co. and South Carolina Public Service Co. (also referred to as Santee Cooper)* (Virgil C. Summer Nuclear Station, Units 2 and 3), CLI-10-21, 72 NRC 197, 200 (2010) (citing *Crow Butte Resources, Inc. (In Situ Leach Facility, Crawford, Nebraska)*, CLI-09-9, 69 NRC 331, 336 (2009)).

²⁰ National Environmental Policy Act of 1969, Pub. L. No. 91-190, § 102(2)(C)(ii), (iii), 83 Stat. 852, 853-54 (1970), 42 U.S.C. § 4332(2)(C)(ii), (iii).

²¹ See 10 C.F.R. § 51.53(c)(2).

²² *NRDC v. Morton*, 458 F.2d 827, 834, 837 (D.C. Cir. 1972).

²³ See *Seabrook*, CLI-12-5, 75 NRC at ___ (slip op. at 51-54).

²⁴ *Id.* at ___ (slip op. at 53).

information that is available today. A “reasonable” energy alternative—one that must be assessed in the environmental review associated with a license renewal application—is one that is currently commercially viable, or will become so in the near term.²⁵ In this case, the time period for consideration of energy alternatives is not at issue. The Board found that “any reasonable alternative to be evaluated in depth must be an alternative that is available now or in the near future and in any event no later than April 22, 2017, the expiration date of the current license.”²⁶ No party disputes this determination.²⁷

In its Environmental Report, FirstEnergy briefly examined wind energy and solar energy as potential alternatives to a license renewal, but rejected those two options as unreasonable on the ground that, at least in their current state, they are incapable of producing baseload power.²⁸

In their “energy alternatives” contentions, Petitioners object that FirstEnergy’s Environmental Report should have considered more comprehensively wind and/or solar energy.²⁹ Petitioners argue that wind, solar, and storage (either individually or in some combination) qualified as “baseload power” sources that would render the renewal of the Davis-Besse license “unnecessary.”³⁰ Petitioners’ Contention 1, in relevant part, states as follows:

²⁵ *Id.*

²⁶ LBP-11-13, 73 NRC at ___ (slip op. at 23).

²⁷ The Board observes that Joint Petitioners conceded that this was the relevant time period for evaluation of alternatives. *Id.* (citing Tr. at 69). Nor does FirstEnergy challenge this determination. See Appeal at 8. In our *Seabrook* decision, we did not exclude the possibility of a contention with respect to a technology that is likely to be available during the period of extended operation. *Seabrook*, CLI-12-5, 75 NRC at ___ (slip op. at 54 n.245). Petitioners here, however, have not made such a challenge.

²⁸ Application, Vol. 3, App. E, Environmental Report, § 7.2, at 7.2-1 (generally), 7.2-9 (wind), 7.2-9 to 7.2-10 (solar), 7.2-12 to 7.2-13 (combination of wind, solar and/or other alternatives) (Environmental Report).

²⁹ Petition at 10 (wind), 28 (wind and storage), 68-69 (solar), 71 (solar and storage), 93 (wind and solar in combination).

³⁰ Petition at 10, 65, 68-69.

FirstEnergy[’s] Environmental Report fails to adequately evaluate the full potential for renewable energy sources, such as wind power, to offset the loss of energy production from Davis-Besse, and to make the requested license renewal action from 2017 to 2037 unnecessary. In violation of the requirements of 10 C.F.R. [§ 51.53(c)(3)(iii)] and of the GEIS § 8.1, [FirstEnergy’s] Environmental Report (§ 7.2) treats all of the alternatives to license renewal except for natural gas and coal plants as unreasonable and does not provide a substantial analysis of the potential for significant alternatives, such as wind power, in the Region of Interest [ROI]³¹ for the requested relicensing period of 2017 to 2037.³²

Petitioners’ Contention 2 makes a substantively identical challenge with respect to solar power (including solar electric power or photovoltaics).³³ Contention 3 argues that the combination of wind and solar power should be considered as a single, “combined-source” alternative to license renewal.³⁴

The Board combined the three contentions into one, excluding certain issues raised by Petitioners,³⁵ and admitting the resulting consolidated, narrowed Contention 1:

³¹ FirstEnergy defines the region of interest for Davis-Besse as “Ohio and the wholesale power market there.” Appeal at 10. *Accord* Tr. at 83. Petitioners define the region of interest as “Ohio, Pennsylvania, West Virginia, [and] New Jersey.” Petition at 38. *See also id.* at 20-21, 31-32, 43, 51; Tr. at 55. FirstEnergy takes issue with the inclusion of New Jersey. Tr. at 83. We need not address their disagreement here.

³² Petition at 10. Petitioners acknowledge that they “restated in this case a wind power contention which [one of them, Beyond Nuclear, had] prepared and filed as an . . . intervenor in the Seabrook [license renewal] proceeding.” Petitioners’ Opposition at 7.

³³ Petition at 68-69. Both contentions go on to state, in virtually identical language, that:

The scope of the SEIS is improperly narrow, and the issue of the need for Davis-Besse as a means of satisfying demand forecasts for the relicensing period must be revisited due to dramatically-changing circumstances in the regional energy mix that are currently [under way] already during this decade of Davis-Besse’s remaining operating license (2010 to 2017), and can especially be expected to accelerate and materialize over two decades to come covering [FirstEnergy’s] requested license extension period (2017 to 2037).

Id. at 10-11 (Contention 1), 69 (Contention 2).

³⁴ *Id.* at 93.

³⁵ LBP-11-13, 73 NRC at __ (slip op. at 23) (finding, as discussed above, that Petitioners’ references to what may happen between 2017 and 2037 are immaterial and that Petitioners’ “need for power” argument is outside the scope of the proceeding); 24 (excluding Petitioners’ arguments that the GEIS is both outdated and legally void under NEPA).

[FirstEnergy's] Environmental Report fails to adequately evaluate the full potential for renewable energy sources, specifically wind power in the form of interconnected wind farms and/or solar photovoltaic power, in combination with compressed air energy storage, to offset the loss of energy production from Davis-Besse, and to make the requested license renewal action unnecessary.^[36] [FirstEnergy's] Environmental Report (§ 7.2) treats all of the alternatives to license renewal except for natural gas and coal plants as unreasonable and does not provide a substantial analysis of the potential for significant alternatives in the Region of Interest.³⁷

FirstEnergy, on appeal, argues that the admitted contention is unclear as reformulated, and interprets the contention to include the alternative of wind farms without compressed air energy storage.³⁸ However, the bases of the original Contention 1 discussed both the use of compressed air energy storage and alternative technologies to compensate for the intermittency of wind.³⁹ Given that the Board expressly set forth those matters excluded from the contention, we interpret the admitted contention to include the alternative of wind farms without compressed air energy storage.⁴⁰

³⁶ FirstEnergy argues on appeal that the Board imposed the “wrong legal standard” in reformulating the contention to say that the renewable alternatives would make renewing the Davis-Besse license “unnecessary.” See Appeal at 17 (citing LBP-11-13, 73 NRC at ___ (slip op. at 34)). In particular, FirstEnergy cites 10 C.F.R. § 51.95(c)(4), which sets forth the requirement that Staff will make a recommendation of the “environmental acceptability” of the license renewal action, and the Commission shall determine “whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.” FirstEnergy correctly reflects the findings the agency must make in conducting its environmental review for license renewal. However, we interpret the Board’s inclusion of the language not to apply a different standard, but simply to restate Petitioners’ fundamental argument that baseload power could be supplied by Petitioners’ proposed alternatives, as opposed to the Davis-Besse facility.

³⁷ LBP-11-13, 73 NRC at ___ (slip op. at 64).

³⁸ Appeal at 6-7 & n.35.

³⁹ See Petition at 28, 40.

⁴⁰ See LBP-11-13, 74 NRC at ___ (slip op. at 23-24). At least arguably, Petitioners have abandoned their Contentions 1 and 2 (wind without storage and solar without storage, respectively). At oral argument, Petitioners’ representative agreed with Judge Kastenberg’s statement that they were not “contending that one could build a wind site and maybe a solar site, and that that, *in and of itself*, would be sufficient to replace the generation of electricity at Davis-Besse.” Tr. at 58 (emphasis added). *Cf. id.* at 104 (Mr. Lodge, agreeing that original (continued . . .)

b. *Discussion*

FirstEnergy asserts that the reformulated contention improperly would require FirstEnergy to evaluate Petitioners' proposed alternatives, which it claims are "remote and speculative."⁴¹ For an alternative energy source to be considered reasonable for purpose of this proceeding, the alternative should be commercially viable and technically capable of producing 908 MWe of baseload power now or in the near future—in this case, no later than 2017, the expiration date of the current Davis-Besse operating license. To proffer an admissible "energy-alternatives" contention, therefore, Petitioners must provide factual support or expert opinion sufficient to demonstrate a genuine dispute as to whether an alternative energy source—or combination of sources—can meet that standard. As discussed below, we find that Petitioners have provided insufficient support for the consolidated contention and that, therefore, the Board erred in admitting it.

Petitioners have provided support for the propositions that (i) wind power and solar power are both capable of producing a great deal of energy in ideal locations,⁴² (ii) wind power could produce significant gross (installed) capacity in the region of interest,⁴³ and (iii) technological alternatives such as storage and integration may eventually become available to compensate for the intermittency of wind and solar, such that the combination could become

Contention 2 "implies [that] you need solar with storage of some sort"), 109-10. However, we decline to exclude Contentions 1 and 2 based solely on these statements, given the absence of an explicit statement by Petitioners either that they have withdrawn those claims or that the Board's consolidated contention should be read to exclude the alternatives of solar without storage and wind without storage.

⁴¹ Appeal at 7-14.

⁴² See Petitioners' Ex. 33, Marc Schwartz et al., *Assessment of Offshore Wind Energy Resources for the United States* (June 2010) (publication of the National Renewable Energy Laboratory (NREL)). NREL is the United States Department of Energy's laboratory for renewable energy and energy efficiency research and development.

⁴³ *Id.*

sufficiently reliable to constitute “baseload” power.⁴⁴ All in all, however, we agree with FirstEnergy that the Petitioners have failed to lay a foundation for their claim that wind, solar, and energy storage—in any combination—could satisfy the baseload demand in the region of interest by 2017. We therefore find that the Board erred in admitting the contention.

(1) INTERCONNECTED WIND FARMS

FirstEnergy challenges the Board’s conclusion that Petitioners have presented “sufficient ‘minimal’ evidence” to merit adjudication of whether “large-scale interconnected wind farms are currently, or could be by 2017, a viable option” for baseload power.⁴⁵

Petitioners’ claim in this regard is based on the idea that several disparately-located wind farms could be connected in such a way that they provide a constant source of power (because when the wind stops blowing in one location it usually picks up in another).

FirstEnergy argues, however, that Petitioners do not claim, and none of their exhibits show, that interconnected wind farms have been used, to date, to provide baseload power anywhere in the world.

Petitioners rely on an article by two Stanford University engineers (Exhibit 21 in the record of this proceeding).⁴⁶ According to FirstEnergy, Petitioners’ Exhibit 21 acknowledges that interconnected wind power is merely an “idea” (rather than a current or impending reality) and points to no location where the idea has been implemented, even as a demonstration

⁴⁴ See, e.g., Petitioners’ Ex. 20, NREL, *Creating Baseload Wind Power Systems Using Advanced Compressed Air Energy Storage Concepts* (Oct. 3, 2006); Petitioners’ Ex. 21, Cristina L. Archer & Mark Z. Jacobson, *Supplying Baseload Power and Reducing Transmission Requirements by Interconnecting Wind Farms*, 46 J. OF APPLIED METEOROLOGY AND CLIMATOLOGY 1701 (Feb. 2007).

⁴⁵ Appeal at 13 (citing LBP-11-13, 73 NRC at __ (slip op. at 28-29, 34)).

⁴⁶ Ex. 21, *supra* note 44.

project.⁴⁷ This, FirstEnergy argues, does not provide sufficient support for admission of a contention claiming the commercial viability of wind energy in Ohio by 2017.⁴⁸ We agree that Exhibit 21's theoretical model for interconnecting several utility-scale wind facilities is insufficient to support an argument that wind power will be commercially viable on the required scale by 2017.

Next, FirstEnergy challenges the Board's reliance upon two other exhibits. The first, Petitioners' Exhibit 33, is an NREL study of the offshore wind resource within the United States, which attempts to gauge the potential for developing wind power by measuring, among other things, average wind speeds (at 90 meters above the water) and square kilometers of offshore area available for development.⁴⁹ The Board observed that the exhibit indicates that, within FirstEnergy's region of interest, "there is a total resource of 155.5 gigawatts (GW) of offshore and deepwater wind alone."⁵⁰ The second exhibit, Exhibit 42, is a predecisional draft "strategic work plan" prepared by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy "outlin[ing] the actions that it will pursue to support" this country's offshore wind industry.⁵¹ The document itself indicates that key barriers to offshore wind development still exist, including relatively high costs, technical challenges and untested permitting processes.⁵² These documents, FirstEnergy argues, focus on wind as a natural resource, but do not discuss wind as a source of baseload power.⁵³

⁴⁷ Appeal at 13-14 (citing LBP-11-13, 73 NRC at ___ (slip op. at 28-29) (in turn citing Petitioners' Ex. 21 at 1702, 1716)).

⁴⁸ Appeal at 14.

⁴⁹ Ex. 33, *supra* note 42.

⁵⁰ See LBP-11-13, 73 NRC at ___ (slip op. at 28) (citing Petitioners' Ex. 33 at 3, Table 1).

⁵¹ Ex. 42 at ii.

⁵² Ex. 33 at 5.

⁵³ Appeal at 10.

We agree that the exhibits are insufficient to support Petitioners' wind alternatives claim. The mere potential for, or theoretical capacity of, wind generation facilities is insufficient to show their commercial viability as a source of baseload power in the ROI by 2017. Likewise, Petitioners' Exhibit 42 makes clear that commercially viable and technologically feasible offshore baseload wind energy is not yet a reality. In sum, Petitioners' exhibits fall short of providing the requisite support for the proposition that wind, alone or in combination with solar and storage, could produce sufficient baseload power by 2017 as to be considered a reasonable alternative to extending the Davis-Besse license.

(2) COMPRESSED AIR ENERGY STORAGE CAPACITY

FirstEnergy next disputes Petitioners' claim that compressed air energy storage (CAES) could be combined with wind or solar power to produce reliable baseload power in the ROI. FirstEnergy argues that Petitioners did not show that sufficient CAES capacity to equal Davis-Besse's 908-MWe facility could be developed in the ROI by 2017.⁵⁴ FirstEnergy claims that the documents on which the Board based its admissibility ruling—"an expert's declaration and a number of alleged facts from scholarly sources"⁵⁵—fall short of showing that a combination of wind, solar, and storage could provide baseload power by the time it would be required.

Specifically, FirstEnergy questions the Board's reliance upon Petitioners' Exhibit 20, a one-page summary of the concept of "baseload wind" produced by NREL.⁵⁶ This document describes a proposed method for creating baseload wind power by combining it with CAES.

⁵⁴ See *id.* at 9.

⁵⁵ LBP-11-13, 73 NRC at ___ (slip op. at 34). See also *id.* at ___ (slip op. at 27-32).

⁵⁶ Appeal at 10 (citing LBP-11-13, 73 NRC at ___ (slip op. at 28) (in turn citing Petitioners' Ex. 20, *supra* note 44)).

The exhibit itself states that “additional work will be required to examine the feasibility” of the proposed advanced wind/energy storage.⁵⁷

By its own terms, Exhibit 20 addresses only the *hypothetical* combination of wind energy and compressed air energy storage, and acknowledges that this combination has not been put into practice:

While the current penetration of wind energy is far too low to require energy storage, projected growth in the installed base of wind generation motivates thinking about scenarios of extremely large use of wind energy. Development of the “baseload” wind concept will require a greater understanding of the local geologic compatibility of air storage, and additional work will be required to examine the feasibility of advanced wind/CAES concepts described here.⁵⁸

Significantly, the exhibit states that it would require a combination of 900 MWe of CAES and 2000 MWe wind power to effectively arrive at 900 MWe of “baseload power.”⁵⁹

FirstEnergy also questions the Board’s reliance upon Petitioners’ Exhibit 49/54, a press release announcing FirstEnergy’s purchase of rights to the Norton Energy Storage Project, a proposed CAES facility in Norton, Ohio.⁶⁰ FirstEnergy argues, among other things, that the Norton Project would provide only 268 MWe of capacity today—nowhere near the 908 MWe needed to replace Davis-Besse’s capacity.⁶¹ Moreover, the press release makes clear that this project is still in the early stages of development.⁶² The mere possibility of a 268 MWe CAES

⁵⁷ Appeal at 10 (quoting Ex. 20).

⁵⁸ Ex. 20.

⁵⁹ *Id.*

⁶⁰ Appeal at 10-11. Petitioners’ Ex. 54, *FirstEnergy Acquires Rights to Norton Energy Storage Project* (Nov. 23, 2009), is a screenshot version of the press release available at <http://www.hvllc.com/en/rel/94>. Petitioners’ Exhibit 49 is a paper copy of the same press release.

⁶¹ Appeal at 11.

⁶² Ex. 54 at 2 (“The company is evaluating its options related to the project, but has not yet committed to development scope or timing.”).

facility provides scant support for the claim that a facility of this type is a reasonable alternative to Davis-Besse.

Next, FirstEnergy challenges the relevance of Petitioners' Exhibit 48/66, a *Scientific American* magazine article evaluating solar energy's potential to end our country's dependence on foreign oil by 2050.⁶³ We observe that the year 2050 falls well beyond the expiration date of the proposed renewed license, and the article provides little discussion of solar energy's potential in the relative near-term, that is, by 2017. Moreover, the article does not suggest that a solar facility would be sited in the region of interest.⁶⁴

In addition, FirstEnergy challenges the Board's reliance upon Petitioners' Exhibit 11—a book by Dr. Arjun Makhijani, in which the author purportedly observes that, based on the advances in compressed air energy storage, the NREL now recognizes the existence of “baseload wind.”⁶⁵ Although Dr. Makhijani discusses various energy storage strategies for overcoming the intermittency of wind and solar resources, he also indicates that currently storage is not considered “necessary” because these technologies provide such a small percentage of the market that “reserve capacity can be supplied in other ways” (i.e., through natural gas).⁶⁶ Thus, while the book discusses possible solutions to the intermittency problem

⁶³ LBP-11-13, 73 NRC at ___ (slip op. at 26-27) (citing Petitioners' Ex. 48, Ken Zweibel, et al., *By 2050 Solar Power Could End U.S. Dependence on Foreign Oil and Slash Greenhouse Gas Emissions*, *Sci. Am.* 64 (Jan. 2008)). Dr. Compaan refers to the identical article as Exhibit 66. See Petition at 87.

⁶⁴ The article presents a plan for linking proposed solar power plants to be built in the desert southwest through a proposed transmission system throughout the country.

⁶⁵ Ex. 11, Arjun Makhijani, *Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy* (Aug. 2007).

⁶⁶ *Id.* at 62.

that may one day be put into practice, we find nothing to indicate that these would be ready in time to support generation of baseload power at Davis-Besse.⁶⁷

We therefore conclude that Exhibits 11, 20, 48/66, and 49/54, considered individually and together, do not provide the requisite factual support for the claim in the consolidated contention that renewable alternatives could supply baseload power in the ROI by 2017, as required under 10 C.F.R. § 2.309(f)(1)(v). Because Petitioners have not supported that claim, they also have failed to show a genuine dispute with the application as required under 10 C.F.R. § 2.309(f)(1)(vi). We conclude that the Board erred in admitting the contention, to the extent that it relied on these exhibits.

This leaves for our consideration the Compaan Declaration,⁶⁸ which addresses the Petitioners' "solar" and "solar plus storage" alternatives. The Board supported its admissibility ruling by citing the following conclusions by Dr. Compaan:

Dr. Compaan . . . notes that "[s]olar power has a CO₂ footprint that is much smaller than the full fuel chain of nuclear." According to Dr. Compaan, "[e]conomical sources of energy storage and back-up power are available to provide good base-load power, in conjunction with solar." Dr. Compaan further

⁶⁷ Although both the Board and Petitioners refer to Dr. Makhijani's reference, neither one provides a citation to the relevant page in his book. See Petition at 28; LBP-11-13, 73 NRC at ___ (slip op. at 27). As we have stated before, neither we nor the Board are obliged to look through lengthy documents for information on which a litigant relies. See, e.g., *Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station)*, CLI-09-11, 69 NRC 529, 534 (2009) ("The Commission should not be expected to sift unaided through earlier briefs or other documents filed before the Board to piece together and discern a party's argument and the grounds for its claims. . . . References to such affidavits and other exhibits should include page citations.") (citation and internal quotation marks omitted).

⁶⁸ Dr. Compaan represents in his Declaration that he authored part of the Petition relevant to solar power (original Contention 2). Dr. Compaan did not include in his Declaration a substantive analysis to support Contention 2, but instead stated that he had written all of the Petition's factual arguments supporting the original Contention 2 (the "solar alternative" contention) and that all scientific conclusions in that contention were his own. Compaan Declaration at 1-2 (citing Petition at 68-90).

concludes that “wide-scale installation of solar power combined with a storage facility . . . is a very viable alternative” to the . . . Davis-Besse license extension.⁶⁹

Dr. Compaan acknowledges that solar power by itself is not *baseload* power.⁷⁰

Moreover, only five pages of the Petition address the issue of potential solar power supplemented by energy storage to create baseload.⁷¹ In reviewing his declaration, it appears that Dr. Compaan has not identified a “solar plus storage” combination that can, as a *practical* matter, produce baseload power either now, or in time to constitute a reasonable alternative to relicensing Davis-Besse. Although his Declaration may support the *eventual* development of baseload solar power generation, we agree with FirstEnergy that Dr. Compaan has failed to provide the Board the necessary support for the proposition that wind or solar facilities constitute a reasonable alternative to the renewal of the Davis-Besse operating license.

We therefore conclude that Dr. Compaan’s Declaration, and the portion of the Petition to which it refers, do not provide for Petitioners’ consolidated contention either the expert or factual support required under 10 C.F.R. § 2.309(f)(1)(v), or, consequently, the showing of a genuine dispute as required under 10 C.F.R. § 2.309(f)(1)(vi). Given the absence of such support, we conclude that the Board’s reliance on the Compaan Declaration was misplaced.⁷²

⁶⁹ LBP-11-13, 73 NRC at __ (slip op. at 27) (footnotes omitted) (quoting Petition at 71 and citing Compaan Declaration at 1-2.) The Board’s third quotation actually is found on page 89 of the Petition.

⁷⁰ Petition at 85 (“Solar power naturally is an intermittent resource”).

⁷¹ See Petition at 71-72 and 87-89.

⁷² One additional matter merits brief mention. FirstEnergy asserts that the Board impermissibly converted a contention of omission—that “Commercial Wind and Solar Photovoltaic Baseload Power Should be Considered”—into a contention challenging the adequacy of the ER. Appeal at 16 (emphasis in original). See *also id.* at 14. This question is not material to today’s decision, given that we reverse admission of the contention regardless of its label. But we nonetheless observe that Petitioners challenge the adequacy of FirstEnergy’s existing analysis of solar and wind as alternative energy sources (see Environmental Report, § 7.2, at 7.2-1 (generally), 7.2-9 (wind), 7.2-9 to 7.2-10 (solar), 7.2-12 to 7.2-13 (combination of wind, solar, and/or other alternatives)). Such a challenge is not a contention of omission. See *Duke Energy* (continued . . .)

For all of these reasons, the Board erred in admitting the consolidated contention.

2. Severe Accident Mitigation Alternatives

Petitioners' Contention 4 states as follows:

The Environmental Report is inadequate because it underestimates the true cost of a severe accident at Davis-Besse in violation of 10 C.F.R. § 51.53(c)(3)(ii)(L) and further analysis by the Applicant, [FirstEnergy], is called for.

Contention 4 challenges FirstEnergy's SAMA analysis for Davis-Besse. The SAMA analysis is a site-specific mitigation alternatives analysis under NEPA. The analysis looks for potential additional mitigation measures—e.g., hardware or procedures—that could be implemented at a particular plant to further reduce severe accident risk (the probability or consequences of a severe accident). By practice, the SAMA analysis for license renewal has been a cost-benefit analysis, weighing a particular mitigation measure's estimated degree of risk reduction against its estimated cost of implementation. We outlined in greater detail the nature and purposes of the SAMA analysis in the *Pilgrim* proceeding, and do not repeat that full description here.⁷³

It bears re-emphasizing, however, that because the SAMA analysis is largely quantitative, resting on inputs used in computer modeling, it will always be possible to propose that the analysis use one or more other inputs. But simply because a computer model also could have been run with alternate inputs does not suggest that the inputs used were unreasonable. We therefore have stressed that the "proper question is not whether there are plausible alternative choices for use in the analysis, but whether the analysis that was done is

Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 382-84 (2002).

⁷³ See *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC 287, 290-91, 316-17; *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC 202, 207-08 (2010).

reasonable under NEPA.”⁷⁴ To challenge an application, a petitioner must point with support to an asserted deficiency that renders the SAMA analysis unreasonable under NEPA. In other words, “[a] contention proposing alternative inputs or methodologies must present some factual or expert basis for why the proposed changes in the analysis are warranted (*e.g.*, why the inputs or methodology used is unreasonable, and the proposed changes or methodology would be more appropriate).”⁷⁵ Unless a petitioner sets forth a supported contention pointing to an apparent *error or deficiency* that may have significantly skewed the environmental conclusions, there is no genuine material dispute for hearing.

Petitioners’ Contention 4 is essentially identical to the SAMA contention submitted in the *Seabrook* license renewal proceeding.⁷⁶ As in *Seabrook*, the submitted contention set forth six categories of asserted deficiencies, labeled “a” through “f.”⁷⁷ Contention 4 claimed that each of the asserted deficiencies, either individually or “together with one or more of the others, improperly minimized costs likely to result in a severe accident.”⁷⁸ At bottom, the contention claimed that inputs, assumptions, computer models, or methodology used in the SAMA analysis “minimized costs likely to be incurred in a severe accident,” and that “this appears not to be justified.”⁷⁹

The Board in LBP-11-13 rejected numerous issues raised in the contention, on grounds that they (1) fell outside the scope of a license renewal proceeding; (2) failed to raise a material

⁷⁴ See *Seabrook*, CLI-12- 5, 75 NRC at __ (slip op. at 28-29).

⁷⁵ *Id.* at __ (slip op. at 29).

⁷⁶ Compare Petition at 100-51 to *Friends of the Coast and New England Coalition Petition for Leave to Intervene, Request for Hearing, and Admission of Contentions* (Oct. 20, 2010) at 34-77 (available at ML102940558).

⁷⁷ Petition at 104.

⁷⁸ *Id.* at 103.

⁷⁹ *Id.*

issue; (3) lacked support by asserted fact or expert opinion; or (4) failed to show a genuine dispute with the renewal application.⁸⁰ The Board admitted Contention 4, “narrowed . . . down” to what the Board called the contention’s “admissible core.”⁸¹ In particular, the Board found admissible Petitioners’ challenges to the SAMA analysis’s source terms, decontamination costs estimate, and plume dispersion modeling.⁸² The Board recast Contention 4 as follows:

The Environmental Report (ER) is inadequate because it underestimates the true cost of a severe accident at Davis-Besse in violation of 10 C.F.R. § 51.53(c)(3)(ii)(L) and further analysis by the Applicant . . . is called for because of:

- (1) Minimization of the potential amount of radioactive material released in a severe accident by using a source term . . . based on radionuclide release fractions . . . which are smaller for key radionuclides specified than the release fractions specified in NRC guidance;
- (2) Use of an inappropriate air dispersion model, the straight-line Gaussian plume, that does not allow consideration of the fact that winds for a given time may vary spatially, . . . ignores the presences of Great Lakes ‘sea breeze’ circulations which dramatically alter air flow patterns, fails to account for hot spots of radioactivity caused by plumes blowing . . . offshore over Lake Erie, and is based on meteorological inputs . . . collected from just one site—at Davis-Besse itself; and
- (3) Use of inputs that minimized and inaccurately reflected the economic consequences of a severe accident, specifically particle size and clean-up costs for urban areas.⁸³

FirstEnergy appeals the admission of Contention 4. FirstEnergy argues that the Board erred by admitting claims that merely amount to calls for “alternative analysis,” with no showing that the “the original analysis failed to meet applicable requirements.”⁸⁴ FirstEnergy particularly claims that Petitioners did not provide the necessary factual or expert support for their

⁸⁰ LBP-11-13, 73 NRC at __ (slip op. at 38-49).

⁸¹ *Id.* at __ (slip op. at 38).

⁸² *Id.* at __ (slip op. at 50-62).

⁸³ *Id.* at __ (slip op. at 50) (quotations and citations to Petition omitted).

⁸⁴ Appeal at 20 (quoting *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), LBP-08-13, 68 NRC 43, 187 (2008)).

challenges to the Davis-Besse SAMA analysis.⁸⁵ Finally, FirstEnergy argues that the Board drew unwarranted and impermissible factual inferences—unsupported by the documents Petitioners cited—to admit the contention.⁸⁶ We agree that the Board erred in admitting portions of the SAMA contention. Below we address each of the three issues that the Board admitted as part of Contention 4.

a. *Source Terms*

Petitioners challenge the computer code used to determine source terms in the SAMA analysis, the Modular Accident Analysis Progression (MAAP) code. Petitioners argue that the SAMA analysis minimizes the potential amount of radioactive release in a severe accident because source terms used in the analysis were generated by the MAAP code. More specifically, Petitioners claim that the MAAP code is an industry code that “has not been validated by the NRC,” and that it generates radioactive release fractions that are “consistently smaller for key radionuclides than the release fractions specified in NUREG-1465 and its recent revision for high-burnup irradiated nuclear fuel.”⁸⁷ Petitioners go on to state that the source term used in the analysis “results in lower consequences than would be obtained from NUREG-1465 release fractions and release durations.”⁸⁸ They additionally claim that “MAAP generates lower release fractions than those derived and used by NRC in [severe accident] studies such as NUREG-1150.”⁸⁹

Petitioners’ challenge to the use of the MAAP code is substantively identical to the source term challenge raised in *Seabrook*. For the reasons outlined in our *Seabrook* decision,

⁸⁵ *Id.* at 21-30.

⁸⁶ *Id.*

⁸⁷ See Petition at 112.

⁸⁸ *Id.*

⁸⁹ *Id.* at 113.

Petitioners' source term claims are weak, but because the Board is the appropriate arbiter of such fact-specific questions of contention admissibility, we defer to the Board on admission of this limited aspect of the SAMA contention.⁹⁰

b. Atmospheric Dispersion Modeling

Petitioners challenge the use in the SAMA analysis of a straight-line Gaussian plume atmospheric dispersion model to depict the dispersion and transport of a radioactive plume in a severe accident. A straight-line Gaussian model is embedded in the MACCS2 computer code, used to perform the SAMA analysis.

Petitioners claim that the plume model was not "appropriate for Davis-Besse's Great Lakes shoreline site."⁹¹ They argue that the "straight-line, steady-state Gaussian plume model does not allow consideration of the fact that the winds for a given time period may be spatially varying [e.g., may change wind direction], and . . . ignores the presences of Great Lakes 'sea breeze' circulations which dramatically alter air flow patterns."⁹² Petitioners also argue that a one-dimensional plume model would not be able to accurately depict the effects of terrain variability, and that meteorological data collected from only the Davis-Besse site was insufficient for the SAMA analysis.⁹³

Petitioners further claim that FirstEnergy should have used a "variable plume model such as AERMOD or CALPUFF," models that the Environmental Protection Agency uses to enforce compliance with the Clean Air Act.⁹⁴ They claim that a variable wind trajectory model would show a radiological "dose [that would] be more concentrated . . . and extend over a larger

⁹⁰ See *Seabrook*, CLI-12-5, 75 NRC at __ (slip op. at 29-33).

⁹¹ Petition at 116.

⁹² *Id.* at 119.

⁹³ *Id.* at 122-25, 126-34.

⁹⁴ *Id.* at 116-17.

area” than the dose modeled in the Davis-Besse SAMA analysis.⁹⁵ They argue that the straight-line Gaussian plume model “underestimated the area likely to be affected in a severe accident and the dose likely to be received in those [modeled] areas.”⁹⁶

First, it bears noting that a large portion of the plume modeling arguments and cited references in the petition focused on asserted deficiencies in the straight-line Gaussian plume model’s ability to model “the impact of terrain effects on atmospheric dispersion.”⁹⁷ The Board, however, explicitly found that Petitioners had not supported their claim that the Davis-Besse location, in the areas relevant to the SAMA analysis modeling, is “surrounded by complex terrain.”⁹⁸ Petitioners acknowledged that the Davis-Besse Environmental Report describes the “terrain in the western Lake Erie region [as] mostly flat,” with “little influence on the weather,”⁹⁹ but argued that “slight variations in the surrounding region’s topography” would significantly skew plume modeling results obtained with a straight-line Gaussian plume model.¹⁰⁰ The Board rejected arguments involving potential impact of terrain variation on wind patterns and plume dispersion, finding that Petitioners failed to “support[] their terrain claim with alleged facts or expert opinion.”¹⁰¹

Although terrain-related arguments were a large part of the plume modeling challenge, the Board admitted the modeling issue based on other asserted deficiencies, including that (1) the straight-line Gaussian plume model did not properly depict “sea breeze” effects; (2) the

⁹⁵ *Id.* at 118.

⁹⁶ *Id.* at 116.

⁹⁷ *Id.* at 122, 124-35.

⁹⁸ LBP-11-13, 73 NRC at ___ (slip op. at 44) (quoting Staff Answer at 62). *See also id.* (slip op. at 55 n.337).

⁹⁹ Petition at 122 (quoting Environmental Report at § 2.10, p. 2.10-1).

¹⁰⁰ *See id.* at 125.

¹⁰¹ LBP-11-13, 73 NRC at ___ (slip op. at 44-45).

model did not depict “plume behavior over water” that could lead to “hot spots” of radioactivity; and (3) the analysis used meteorological input data collected only from the Davis-Besse site, rather than from multiple locations.¹⁰² We agree with FirstEnergy that Petitioners failed to adequately tie their claims to the Davis-Besse SAMA analysis.

We address first the “sea breeze” claim, namely that the SAMA analysis is deficient because the plume model did not account for “Great Lakes ‘sea breeze’ circulations.” As with their terrain impact claims, Petitioners set forth the same arguments and referenced support that the intervenors in the *Seabrook* proceeding presented. But Petitioners here did not adequately link their specific “sea breeze” effect claims to the Davis-Besse location and SAMA analysis.

Instead, Petitioners referenced several site-specific studies of the “sea breeze” phenomenon—studies conducted in New England. These studies are rooted in site-specific wind patterns and other site-specific features observed in portions of New England and the New England coast.¹⁰³ As FirstEnergy claims, while Petitioners refer to the existence of a “well-established body of scholarship on the Great Lakes sea breeze that could be brought into play into this proceeding,” they neither referenced nor described any study or meteorological data bearing on the potential significance of lake breeze effects in areas encompassed by the Davis-Besse SAMA analysis.¹⁰⁴

Petitioners appear to assume that observations made in meteorological studies of the New England coast can be transferred to Davis-Besse. For example, citing to an Eastern Massachusetts “sea breeze” study, Petitioners claim that “Great Lakes ‘sea breeze’ winds

¹⁰² See *id.* at ___ (slip op. at 56-59, 64-65).

¹⁰³ See, e.g., Thorp, J., *The Eastern Massachusetts Sea Breeze Study* (May 2009) (thesis for Master of Science); Wayne M. Angevine, et al., *Modeling of the Coastal Boundary Layer and Pollutant Transport in New England*, 45 J. OF APPLIED METEOROLOGY AND CLIMATOLOGY 137 (2006) (Angevine Study).

¹⁰⁴ See Appeal at 26 (quoting Petitioners’ representative at Tr. 188).

heading initially 'out to sea' on Lake Erie are drawn back on shore . . . sometimes penetrating inland here to 20-40 miles."¹⁰⁵ Petitioners attempt to tie the New England "sea breeze" studies cited in the *Seabrook* proceeding to the Davis-Besse region by quoting generalized statements from two weather websites. These statements, however, merely note that large bodies of water, such as a Great Lake, also can have "sea breeze" types of wind circulation.¹⁰⁶

With no factual or expert support indicating that site-specific "sea breeze" observations from studies of the New England coast are equally applicable to the Davis-Besse region, the relevance of the cited studies to Petitioners' claims is limited. The strength, duration, frequency, and penetration distance of sea breeze effects logically will vary depending upon local climate and geography. And as we stressed in *Pilgrim*, these are key considerations underlying whether "sea breeze" effects have the potential to make any material difference in a SAMA analysis, given the nature of the analysis.¹⁰⁷ The "overall impact on the SAMA cost-benefit

¹⁰⁵ Petition at 120.

¹⁰⁶ More specifically, the Petition states the following in regard to the "lake breeze" effect:

[T]he U.S. National Oceanographic and Atmospheric Administration's [NOAA] National Weather Service states on its website 'The Sea Breeze' that 'While the sea breeze is generally associated, with the ocean, they can occur along the shore of any large body of water such as the Great Lakes.' Keith C. Heidorn, PhD., also wrote on May 10, 2000 that 'The lake breeze is similar to the sea breeze found along sea coasts.'

See Petition at 117-18 (emphasis in original) (citations to websites omitted). The two cited websites are <<http://www.srh.weather.gov/srh/jetstream/ocean/seabreezes.htm>> (last visited Feb. 29, 2012) (a National Weather Service website) and <http://www.islandnet.com/~see/weather/almanac/arc2000/alm00may2.htm> (last visited Feb. 29, 2012) (a website called "The Weather Doctor" created by Keith C. Heidorn). FirstEnergy claims that "The Weather Doctor" is "not a peer-reviewed, or nationally recognized institutional source, of reliable scientific information." See Appeal at 26. Given that we are at the contention admissibility stage, we decline to make an expert determination today. However, a petitioner or party invoking a website maintained by a private individual should substantiate the accuracy and reliability of the website's content.

¹⁰⁷ See *Pilgrim*, CLI-10-11, 71 NRC at 304-05 & nn.86-88.

analysis may be insignificant” if “sea breeze” or other effects are largely localized or occur a relatively small portion of the year for limited hours a day.¹⁰⁸

Unlike the intervenors in the *Pilgrim*¹⁰⁹ or *Seabrook* proceedings, Petitioners here had nothing in the way of site-specific (or region-specific) meteorological articles, studies, data, or expert opinion proffered in support of what are, after all, site-specific meteorological claims challenging a site-specific analysis. “Sea breeze” studies for areas in New England and generic descriptions of a “lake breeze” effect are insufficient to support Petitioners’ claim that lake breeze effects *in the Davis-Besse SAMA area* are a “critical feature” that if modeled by variable wind trajectory models credibly would depict “dramatically” different atmospheric dispersion and significantly greater accident consequences.¹¹⁰ We therefore conclude that the Board erred in admitting the “sea breeze” claims.

The Board also admitted a challenge to the straight-line Gaussian plume model based upon Petitioners’ claims regarding the “behavior of plumes over water.”¹¹¹ Specifically, Petitioners claimed that a plume “over water, rather than being rapidly dispersed, will remain tightly concentrated due to the lack of turbulence, and will remain concentrated until winds blow it onto land.”¹¹² Petitioners argue that this could lead to “hot spots of radioactivity in places along the sea coast or Great Lakes shoreline, certainly to Detroit/Windsor, Toledo, and

¹⁰⁸ *Id.* at 304.

¹⁰⁹ Our decision in *Pilgrim* to remand a plume modeling challenge largely hinged on expert opinion submitted by Pilgrim Watch. *See id.* at 302-04. The decision additionally stressed that the Board majority simply had not addressed what we saw as significant factors regarding the materiality of the “sea breeze” claims. *See id.* at 304-07.

¹¹⁰ *See* Petition at 119-20.

¹¹¹ LBP-11-13, 73 NRC at ____ (slip op. at 56-57).

¹¹² Petition at 121.

Cleveland, bringing larger doses over a greater geographic area than modeled and with high population concentrations.”¹¹³

The Board concluded that two articles, both referenced in the *Seabrook* and *Pilgrim* proceedings, presented sufficient support for this claim.¹¹⁴ One is a study of tracer plumes emitted from Boston, Massachusetts and New York City, following the plumes’ transport in New England.¹¹⁵ It particularly emphasizes the effects of local New England coastline features, or what it terms the area’s “coastal geometry.”¹¹⁶ We examined the article, but could not discern any statement—nor did Petitioners or the Board identify any—that supports Petitioners’ plume “behavior” claims regarding the Davis-Besse location and SAMA analysis. In fact, the Board’s only comment in regard to this study was that it was “cited” in the second article (authored by Dr. Jan Beyea) to support Dr. Beyea’s conclusion that “releases *from Pilgrim* headed initially out to sea will remain tightly concentrated due to reduced turbulence until winds blow the puffs back over land,” which “could lead to hot spots of radioactivity in unexpected locations.”¹¹⁷

Neither article that the Board referenced in support of the “hot spots” claim has any apparent direct link to the Davis-Besse region. We agree with FirstEnergy that both articles are clearly focused on a different part of the country, and that neither Petitioners nor the Board

¹¹³ *Id.*

¹¹⁴ LBP-11-13, 73 NRC at ___ (slip op. at 57).

¹¹⁵ See generally Angevine Study.

¹¹⁶ See *id.* at 153.

¹¹⁷ LBP-11-13, 73 NRC at ___ (slip op. at 57) (emphasis added) (quoting Beyea, “Report to the Massachusetts Attorney General on the Potential Consequences of a Spent-Fuel-Pool Fire at the Pilgrim or Vermont Yankee Nuclear Plant” (May 2006), at 11 (Beyea Article). The Beyea Article may be found as an attachment to *Pilgrim Watch’s Answer Opposing Entergy’s Motion for Summary Disposition of Pilgrim Watch Contention 3* (June 29, 2007) (ML071840568, at 97). Dr. Beyea’s article goes on to suggest that “[r]eduction of turbulence on transport from Pilgrim across the water to Boston should be . . . studied,” although this “would not be likely to make more than a factor of two difference in risk.” See *id.*

explained how the articles were “relevant to site-specific meteorological conditions or a SAMA analysis at Davis-Besse.”¹¹⁸ We conclude that the Board erred in finding the articles sufficient factual support for the claim that concentrated “hot spots” of radioactivity “might be a factor near Davis-Besse.”¹¹⁹

The Board additionally admitted as part of this contention Petitioners’ claim that there is a “significant defect” in the SAMA analysis because it uses meteorological input data (e.g., wind speed, wind direction) collected “from just one site—at Davis-Besse itself.”¹²⁰ Petitioners claim that data from one meteorological station “will definitely not suffice to define the Great Lakes ‘sea breeze’ or capture [terrain] variability.”¹²¹

Petitioners argue that FirstEnergy should have “augment[ed]” meteorological data obtained onsite with meteorological data obtained from the “nearby Toledo Express commercial airport,” and from NOAA.¹²² They state that the Davis-Besse Environmental Report referenced meteorological data taken from the Toledo airport, but FirstEnergy failed to use the airport data in the SAMA analysis.¹²³ Petitioners’ representative stressed that FirstEnergy has “taken a big shortcut on these SAMA analyses by not even including those data points” available from NOAA weather monitors and the Toledo airport.¹²⁴ He further claimed that FirstEnergy is “potentially missing very significant information” on “radioactive clouds” that under the straight-line Gaussian plume model “would appear to go out into Lake Erie,” but may “actually remain[]

¹¹⁸ Appeal at 26.

¹¹⁹ LBP-11-13, 73 NRC at ___ (slip op. at 57).

¹²⁰ Petition at 125.

¹²¹ *Id.*

¹²² Reply at 36. See also Tr. at 187.

¹²³ Reply at 36.

¹²⁴ Tr. at 187.

concentrated because of a lack of any terrain features on the lake to break up that cloud,” and may “return[] to land with the sea breeze, very concentrated,” potentially “end[ing] up in Toledo downtown, Cleveland downtown.”¹²⁵

But Petitioners provide no support for the asserted potential scenario of “concentrated” radioactive plumes extending to Toledo and Cleveland that would have been missed by the SAMA analysis plume model and inputs. Nor do Petitioners make an effort to describe how the “data points” they claim should have been used suggest potential plume trajectories or behaviors that could have led to predictions of much greater accident consequences in the SAMA analysis.¹²⁶ At the contention admissibility stage, it is *Petitioners’* burden to come forward with factual or expert support for their argument that use of additional weather data from Toledo or another site credibly could have altered the SAMA analysis to show significantly greater accident consequences and, as a result, significantly different cost-benefit results.

We note that at the prehearing conference, the Board asked counsel for FirstEnergy why meteorological data from other locations were not used for the analysis. Counsel replied that his understanding was that the MACCS2 atmospheric dispersion model “allows for input . . . from [only] a single location,” and that “it made sense to use site-specific data to model the release from our site.”¹²⁷ The Board then asked FirstEnergy counsel whether there was “any reason to believe that if [FirstEnergy] had used Toledo Airport [meteorological] data or other local [meteorological] data” there would have been a different SAMA analysis “answer.”¹²⁸ But

¹²⁵ *Id.*

¹²⁶ See Environmental Report §§ 2.10.1, 2.10.3, at 2.10-1, 2.10-3 (referencing Toledo airport data obtained from NOAA).

¹²⁷ Tr. at 203-05 (Mr. Polonsky).

¹²⁸ *Id.* at 205 (Trikouros, J.). Counsel for FirstEnergy replied that he did not have any reason to believe that other local meteorological data would change the SAMA analysis results. *Id.* (Mr. Polonsky).

again, the burden is on Petitioners to come forward with the support—the “reason to believe”—that reliance on the onsite meteorological data posed a “significant defect,” plausibly skewing the SAMA cost-benefit results. With no such factual or expert support, Petitioners’ claims constitute speculation.

The Board in LBP-11-13 ultimately concluded that it was “self-evident” that a “single immobile meteorological site would be unable to measure . . . spatially dependent circulation.”¹²⁹ Even if true, however, the question is not the extent of the capabilities of the straight-line Gaussian plume model, but its adequacy for a NEPA SAMA analysis for the Davis-Besse site. Simply because data from “a single meteorological site is inadequate to provide data for a complex circulation model”¹³⁰ does not suggest that a complex atmospheric dispersion model is necessary for a reasonable SAMA analysis.

Unlike plume modeling for an actual severe accident, the SAMA analysis is not focused on predicting the precise trajectory of a real-time plume. As we noted in *Pilgrim*, the SAMA analysis is a probabilistic analysis involving “statistical averaging over many hundreds of randomly selected hourly weather sequences” obtained from a year of hourly weather data.¹³¹ To suggest that the onsite data obtained from the Davis-Besse site was deficient, Petitioners should have provided some indication of how that data was not sufficiently representative of the meteorological conditions in the 50-mile radius area around Davis-Besse, encompassed by the SAMA analysis. While we do not require petitioners to run their own computer models at the contention admissibility stage, a contention challenging a SAMA analysis nonetheless must be tethered to the computer modeling and mathematical aspects of the analysis.

¹²⁹ LBP-11-13, 73 NRC at ___ (slip op. at 58).

¹³⁰ *Id.*, 73 NRC at ___ (slip op. at 58-59).

¹³¹ See *Pilgrim*, CLI-10-11, 71 NRC at 304 n.87 (describing “total population dose”).

Petitioners cite to various guidance documents that point out that there can be reasons warranting use of additional meteorological data collection sites, and further, that a straight-line Gaussian plume model may not be appropriate for all applications.¹³² But none of the cited documents is focused on the data input or methodology needs for the NRC's license renewal SAMA analysis. Staff-endorsed guidance specific to performing SAMA analyses approves use of meteorological data obtained from the plant meteorological tower.¹³³ Without more, the cited material does not provide the necessary support for Petitioners' claim of a "significant defect" in the Davis-Besse SAMA analysis.¹³⁴

As Judge Trikouros stated at the prehearing conference, merely because a computer model may be simpler does not mean that it would be less conservative (e.g., would under-predict radiological doses) because "sometimes the simpler model gives higher doses than the

¹³² For example, quoting NRC guidance on onsite meteorological measurements, Petitioners state that the NRC has acknowledged that "at some sites, due to 'complex flow patterns in non-uniform terrain, additional wind and temperature instrumentation and more comprehensive programs may be necessary.'" Petition at 126 (quoting Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants" (Rev. 1, Mar. 2007), at 11). See also Petition at 128. Petitioners additionally cite guidance issued by the Environmental Protection Agency, regarding "air quality models for assessing criteria pollutants under the Clean Air Act." See Final Rule, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, 70 Fed. Reg. 68,218 (Nov. 9, 2005). The EPA guideline is intended for use by states, industry, and EPA for use in preparing or reviewing "new source permits and State Implementation Plan revisions." *Id.*

¹³³ See NEI 05-01, Rev. A at 15.

¹³⁴ Similarly, Petitioners do not support their challenge to the use of meteorological data from the year 2006. See Petition at 125. NRC-endorsed guidance on the SAMA analysis expressly provides for use of either one year of hourly meteorological data or an average of five years. See NEI 05-01, Rev. A at 15. The guidance specifies that the data set and period should be "representative and typical." See *id.* Here, the Environmental Report stated that results of the analysis sensitivity studies had confirmed that the 2006 meteorological data was "representative and typical." See Environmental Report, Att. E at E-35, E-43 to E-44. Petitioners in no respect challenge the representativeness of the data for the 50-mile radius area encompassed by the SAMA analysis, nor otherwise provide any support for their claim that use of the 2006 was insufficient for the analysis.

more complex model.”¹³⁵ Notably, Judge Trikouros expressed concern with the lack of “expert opinion . . . supporting [Petitioners’] contention,” and stressed the “need to make sure that there is something to litigate” in a hearing.¹³⁶ Assuring that our contention admissibility rule is satisfied is particularly important when it is clear that a proffered contention was taken essentially verbatim from another proceeding, and it is not obvious that the contention as proffered also applies to the proceeding at hand. Our strict contention rule is designed to avoid resource-intensive hearings where petitioners have not provided sufficient support for their technical claims, and do not demonstrate a potential to meaningfully participate and inform a hearing. We “reserve our hearing process for genuine, material controversies between knowledgeable litigants.”¹³⁷

We recognize that the technical nature of SAMA computer modeling issues may make for some difficult decisions for the Board at the contention admissibility stage. But here, we can find no basis on which to initiate an adjudicatory proceeding. Petitioners provided neither factual support specific to the Davis-Besse location, nor expert opinion to indicate that the plume model used for the analysis overlooked either notable “lake effects” or other meteorological phenomena that may have significantly altered the Davis-Besse SAMA analysis results.

¹³⁵ Tr. at 202. See also *id.* at 188. Judge Trikouros additionally pointed out that one of the items Petitioners cited in support of their contention, a DOE guidance document on the MACCS2 code, states that because the straight-line Gaussian plume model has limitations in depicting the effects of terrain variation, it is “inherent[ly] conservati[ve],” a point that would tend to go against Petitioners’ claims of under-predicted radiological doses. See Tr. at 201 (quoting Petition at 132).

¹³⁶ *Id.* at 202.

¹³⁷ See *Seabrook*, CLI-11___, 74 NRC at ___ (slip op. at 7) (quoting *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 219 (2003)).

We close with one additional point regarding the plume modeling challenges. In *Seabrook* we deferred to the Board's admission of an essentially identical plume modeling contention. But the proffered factual support in *Seabrook* focused on New England coastal areas, and the Seabrook facility is located on the New England coast. While we found the proffered support not obviously sufficient for the contention, we chose to defer to the Board's overall assessment of the referenced articles and studies.¹³⁸

The *Seabrook* case presented a close call. Here, however, support for the identical contention is even thinner, particularly given that (1) the Board found the arguments regarding overlooked impacts of complex and variable terrain—a large portion of the contention—unsupported as to the Davis-Besse region; and (2) the asserted “sea breeze” and “hot spots” claims lack adequate support as to the Davis-Besse location and SAMA analysis. In the end, the support provided is far too generalized to show a genuine material dispute with the Davis-Besse SAMA analysis. The Board erred in admitting the claim.¹³⁹

c. Radioactive Particle Size and Clean-up Costs

The Board in LBP-11-13 admitted a challenge to the estimated decontamination costs in the SAMA analysis. The Board rejected as unsupported “many of [Petitioners'] assertions of error relating to decontamination costs,” but found “two claims” admissible.¹⁴⁰

First, the Board admitted Petitioners' claims regarding radioactive “particle size.” Petitioners argue that the MACCS2 code's “cost formula” is “outdated and inaccurate” because

¹³⁸ *Id.*, 74 NRC at ___ (slip op. at 41-43) (agreeing with licensee that Intervenors' support for the contention did not obviously demonstrate materiality, but ultimately deferring to Board's assessment).

¹³⁹ We additionally note that the Board found the plume modeling claims potentially material to the SAMA analysis *if they were considered in conjunction with* Petitioners' asserted source term claims. It is not clear that the Board would have found the plume claims by themselves sufficient to raise a material issue. See LBP-11-13, 73 NRC at ___ (slip op. at 59).

¹⁴⁰ LBP-11-13, 73 NRC at ___ (slip op. at 60).

it inappropriately assumes unduly large radioactive particle sizes, akin to those from “nuclear explosions,” which are easier and less expensive to remove.¹⁴¹ Petitioners claim that “earlier estimates” of decontamination costs that were “incorporated in WASH-1400 and up through and including MACCS2 . . . are incorrect because they examined fallout from nuclear explosion of nuclear weapons that produce large particle sizes and high mass loadings.”¹⁴²

Second, the Board admitted Petitioners’ claim that urban areas will be “considerably more expensive and time consuming to decontaminate and clean than rural areas.”¹⁴³ The Board stated that in support of this claim Petitioners had referred to a study on the economic consequences of a “Rad/Nuc Attack,” which “they allege ‘provides estimates for different types of areas, from farm or range land to high density urban areas.’”¹⁴⁴ The Board also noted that Petitioners “suggest that ‘[i]n place of the outdated cost figure in the MACCS2 code, the SAMA analysis should incorporate, for example, the analytical framework contained in’” a 1996 Sandia National Laboratories report on site restoration costs for a plutonium-dispersal accident.¹⁴⁵

On appeal, FirstEnergy argues that “Petitioners provided absolutely no credible information suggesting that FirstEnergy has underestimated offsite economic consequences due to invalid assumptions regarding radionuclide ‘particle size’ or clean-up costs for urban areas.”¹⁴⁶ We agree, for reasons detailed in our *Seabrook* decision, which reversed the Board’s admission of identical “decontamination cost” claims raised in regard to the Seabrook SAMA

¹⁴¹ Petition at 135-37.

¹⁴² See *id.* at 140.

¹⁴³ See LBP-11-13, 73 NRC at __ (slip op. at 60) (quoting Petition at 138).

¹⁴⁴ See *id.* at __ (slip op at 60-61) (quoting Petition at 138-39).

¹⁴⁵ See *id.* at __ (slip op. at 60) (quoting Petition at 140).

¹⁴⁶ Appeal at 27.

analysis.¹⁴⁷ At bottom, Petitioners did not properly support their argument that the Davis-Besse SAMA analysis assumes unduly large radioactive “particle sizes,” or overlooked or underestimated “urban” decontamination costs. They neither directly challenged relevant cost estimates set forth in the Davis-Besse SAMA analysis, nor explained why or how the estimates or “framework” of other studies were appropriate for use in the Davis-Besse site-specific reactor accident SAMA analysis, or would lead to more accurate estimates than those reached in the Davis-Besse analysis. Therefore, for the reasons we set forth in *Seabrook*, we agree with FirstEnergy that the decontamination costs portion of the SAMA contention “lacks adequate foundation,” and “fails to directly controvert the [Environmental Report]”¹⁴⁸ We therefore reverse admission of the decontamination costs claims.

* * * * *

One last matter bears mention. During the pendency of FirstEnergy’s appeal, Petitioners filed in this proceeding a petition requesting, among other things, that we suspend “all decisions” regarding the issuance of renewed licenses, pending completion of several actions associated with the recent nuclear events in Japan.¹⁴⁹ This was one of a series of substantively identical petitions filed in multiple dockets.

We granted the requests for relief in part, and denied them in part.¹⁵⁰ In particular, we declined to suspend this or any other adjudication, or any final licensing decisions, finding no imminent risk to public health and safety, or to common defense and security. The agency

¹⁴⁷ *Seabrook*, CLI-12-5, 75 NRC at ___ (slip op. at 36-47).

¹⁴⁸ Appeal at 30.

¹⁴⁹ See generally *Emergency Petition to Suspend All Pending Reactor Licensing Decisions and Related Rulemaking Decisions Pending Investigation of Lessons Learned from Fukushima Dai’ichi Nuclear Power Station Accident* (Apr. 14, 2011; amended and corrected Apr. 21, 2011).

¹⁵⁰ See generally *Union Electric Co. d/b/a Ameren Missouri* (Callaway Plant, Unit 2), CLI-11-5, 74 NRC ___ (Sept. 9, 2011) (slip op.).

continues to evaluate the implications of the events in Japan for U.S. facilities, as well as to consider actions that may be taken as a result of lessons learned in light of those events. Particularly with regard to license renewal, we stated that “[t]he NRC’s ongoing regulatory and oversight processes provide reasonable assurance that each facility complies with its ‘current licensing basis,’ which can be adjusted by future Commission order or by modification to the facility’s operating license outside the renewal proceeding (perhaps even in parallel with the ongoing license renewal review).”¹⁵¹

III. CONCLUSION

For the reasons set forth above, we affirm LBP-11-13 in part and reverse it in part.

IT IS SO ORDERED.

For the Commission

[NRC SEAL]

/RA/

Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland,
this 27th day of March, 2012

¹⁵¹ *Id.* at __ (slip op. at 26).

Commissioners Svinicki and Apostolakis, Dissenting in Part

We respectfully dissent with regard to Petitioners' challenge to the use of the MAAP code for the determination of source terms in the SAMA analysis. As in *Seabrook*,¹⁵² we find that Petitioners did not present the minimal factual or expert support necessary to demonstrate the existence of a genuine material dispute on this issue. Thus, we conclude that the Board erred in admitting this portion of the SAMA contention.

¹⁵² CLI-12-5, 75 NRC ____ (Mar. 8, 2012) (slip op.) (Commissioners Svinicki and Apostolakis, dissenting in part).